

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIM J. BLACKWELL, PEI C. CHEN,
FRANK D. EGITTO, ALLAN R. KNOLL,
GEORGE J. MATARESE, AND LUIS J. MATIENZO

Appeal No. 1998-0036
Application No. 08/431,203

ON BRIEF

Before JOHN D. SMITH, GARRIS, and TIMM, *Administrative Patent Judges*.
TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the Examiner's final rejection of claims 1-7, 9-11, and 14, which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a method and apparatus for applying a metal coating onto an organic material. Claims 1 and 14 are illustrative:

1. A method of improving the adhesion of a metal to an organic material which has an affinity for moisture, comprising the steps of:
positioning the organic material within a vacuum system;
outgassing the vacuum system in order to reduce the moisture content of the organic material to about 1% to about 2% by weight;
bombarding the organic material with plasma; and
vacuum metallizing at least one layer of metal onto the organic material.

14. A roll sputter system comprising an oxygen DC glow chamber and a chill drum section, wherein the oxygen DC glow chamber is positioned inline apart from the chill drum section.

The prior art references of record relied upon by the Examiner in rejecting the appealed claims are:

Meckel et al. (Meckel)	4,322,276	Mar. 30, 1982
Lindsay et al. (Lindsay)	4,395,313	Jul. 26, 1983
Sartor et al. (Sartor)	4,455,207	Jun. 19, 1984
Ho et al. (Ho)	4,720,401	Jan. 19, 1988
Sallo	4,863,808	Sep. 5, 1989
Swisher	5,112,462	May 12, 1992

Claims 1-7, 9, 11, and 14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Swisher and Lindsey in view of Sartor and Ho. Claim 10 stands rejected under 35 U.S.C. § 103 as being unpatentable over Swisher and Lindsey in view of Sartor and Ho and further in view of Sallo.

Claim 14 stands rejected under 35 U.S.C. § 103 as being unpatentable over Swisher in view of Meckel. We affirm the rejections with respect to the subject matter of claims 1-7 and 9-11, but reverse with respect to the subject matter of claim 14. Our reasons follow.

OPINION

Claim Groupings

Appellants indicate that the claims do not stand or fall together in section VII of the Brief (page 3). However, Appellants do not provide details in this portion of the Brief as to how the claims are to be grouped. Turning to the argument section of the Brief, we note that separate arguments are provided for claims 1 and 14 in subsections VIII(a) and (c)(Brief, pages 4-7 and 8-10). A separate subsection, VIII(b), is provided for arguments directed to the rejection of claim 10, however, the arguments thereunder are directed not to the combination of prior art including the additional reference, Sallo, but to the combination of references used to reject the subject matter of claim 1 and the other claims dependent thereon (Brief, page 7). Therefore, as Appellants have not argued the merits of any particular dependent claim apart from claim 1, we select claims 1 and 14 for consideration of the issues on appeal. 37 CFR § 1.192(c)(7)(1995).

The Process

Claim 1 is directed to a coating process. The Examiner has rejected the subject matter of this claim as unpatentable as obvious over the combination of Swisher, Lindsay, Sartor and Ho. As discussed in the Answer at pages 4-6, Swisher describes a process including steps of positioning a polymeric film in a vacuum system (vacuum chamber 16; Fig. 1) which is outgassed to a pressure of 3 to 30 mTorr (col. 11, lines 36-38), delivering the film to a plasma treatment station 11 operated at a pressure of about 30 to 150 mTorr (col. 11, lines 26-30), bombarding the organic film with plasma in the evacuated plasma chamber (col. 6, lines 19-32), moving the film to a coating roll 17 and vacuum metallizing a layer of metal onto the film in the lower vacuum chamber 18 (col. 9, lines 15-48; col. 11, lines 39-47). Polyimide is the preferred film material (col. 7, lines 1-2). Examples 8-59 exemplify the use of the process to form polyimide film-copper laminates.

Swisher recognizes that drying of the film occurs during the plasma treatment. At column 6, lines 32-38, Swisher discloses that:

The plasma treatment can also cause the film material to be dried or cleaned of materials that can interfere in the vacuum metallization or later formation of metal coatings onto the film surface. The temperatures and pressures common in plasma treatment remove surface water, volatile hydrocarbon material and unreacted monomer.

Swisher does not expressly describe the drying as a reduction of moisture content to about 1% to about 2% by weight as claimed by appellants' "outgassing" step. Swisher, however, does recognize that humidity can decrease the peel strength of polyimide-metal laminates (col. 3, lines 13-20).

Sartor describes a process of subjecting a polymeric substrate to glow treatment before vacuum metallizing a metal layer onto the polymeric substrate (col. 1, lines 6-10). We note that glow treatment is a process of bombarding with plasma. Sartor specifically describes a step of degassing the substrate before plasma treatment to remove once absorbed water from the polymer or plastic. Sartor states at col. 4, lines 1-11:

This degassing treatment removes once absorbed water from the composite plastic member. More significantly this degassing process removes more volatile components which are present in small quantities either already in the resin or in the setting agent, or which are present in the composite due to an incomplete reaction between resin and setting agent. The above-described degassing treatment assures that these annoying components which could be present under vapor-deposition conditions, are removed from the composite plastic substance beforehand.

The degassing is performed for several hours under a vacuum of 0.0001 to 0.000001 millibar (0.075 to 0.00075 mTorr) and a temperature which is above room temperature and between the curing temperature and 20/C below the curing temperature of the polymer.

Ho is also directed to forming vacuum metallized coatings on organic substrates. Like Swisher, Ho exemplifies the formation of polyimide-copper laminates. Ho recognizes that placing a polyimide film within an ultra high vacuum chamber and heating results in desorbing water present in the polyimide film (col. 7, lines 39-42).

Appellants' specification indicates that it was known that polyimide absorbs about 3-4% by weight of water (specification, page 3, lines 49-50). Together, the references suggest that those of

ordinary skill in the art were cognizant of the adhesion problem posed by the presence of absorbed water in the organic material which is used in metallized polymer film laminates such as copper-polyimide laminates. The references also show that those of ordinary skill in the art knew that vacuum application results in desorption of the troublesome water and results in an increase in peel strength. The various references use various levels of vacuum and heat to remove the moisture.

While the particular moisture levels recited in claim 1 of about 1% to about 2% by weight are not expressly disclosed in the references, these levels are within the levels one of ordinary skill in the art would have expected to result in adhesion improvements. The upper limit, about 2%, represents a removal of up to half the moisture within a polyimide initially containing 4% by weight water. The lower limit, about 1%, represents a removal of more than three quarters of the moisture in such a polyimide. We note that the lower limit of “about 1%” is somewhat unclear. The specification provides little guidance on the interpretation of “about”. In fact, the specification indicates that the true moisture level resulting from the outgassing conditions may not be entirely known. The water level is only an estimated level of “about 1% to about 2%” (specification, page 10, lines 17-25) based on the particular vacuum and temperature conditions of the process used.

Under such circumstances, it would have been obvious for one of ordinary skill in the art to perform routine experimentation in order to determine the workable ranges of vacuum and temperature levels which would result in adhesion enhancing moisture reduction levels. We note that it is well settled

that “it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997)(quoting *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)). Where the difference between the claimed invention and the prior art is some range or other variable within the claims, the applicants must show that the particular range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). We conclude that the Examiner has established a *prima facie* case of obviousness with respect to the claimed process.

Appellants argue that none of the references teach reducing the moisture content to about 1% to about 2% by weight. As discussed above, such an express teaching need not be contained in the references to establish a *prima case* of obviousness. Where the modification in process parameters is within the capabilities of one of ordinary skill in the art, the modification will not make the process patentable unless the claimed range produces “a new and unexpected result.” *Aller*, 220 F.2d at 456, 105 USPQ at 235; *Woodruff*, 919 F.2d at 1578, 16 USPQ2d at 1936-37.

Appellants argue that Swisher does not teach separately outgassing the polymeric film, as recited in independent claim 1. We note that claim 1 does not require a separation in time or space between the step of outgassing the vacuum system and the step of bombarding the organic material with plasma. Nothing in claim 1 excludes vacuum system evacuation and plasma treatment from occurring at

the same or overlapping times. Furthermore, we note that the film of Swisher is placed within a vacuum chamber 16 on roll 10. Therefore, the film is subjected to vacuum pressures before entering the plasma treatment station 11.

Appellants further argue that the statement in Sartor that “slight reabsorption of water after the degassing treatment is not disadvantageous” (col. 4, lines 12-13) suggests that the teachings of Sartor are antithetical to those of the Appellants because the statement implies a break in vacuum (Brief, page 6). We note that Appellants’ claims do not exclude a break in vacuum. Note that claim 1 does not require that the steps of bombarding and vacuum metallizing take place within the vacuum system that is outgassed.

Appellants state that the teachings of Lindsay and Ho add nothing to the teachings of the other references (Brief, pages 5 and 6). We agree that the teachings of Lindsay and Ho are not critical to the establishment of a *prima facie* case of obvious with respect to the subject matter of claim 1 with which all the other process claims stand or fall. However, we note that Ho does teach performing a step of desorbing water in polyimide film by heating within an ultra high vacuum chamber (col. 7, lines 39-42). The language used by Ho implies that a vacuum exists within this chamber during the step of annealing to desorb water. Ho is further evidence that those of ordinary skill in the art recognized at the time of the invention that temperature and pressure levels could be manipulated to desorb water from polyimide which is to be metallized.

For the above reasons, we conclude that the Examiner has established a *prima facie* case of obviousness. We note that while Appellants state that enhanced adhesion is achieved by reducing the absorbed moisture to about 1% to about 2% by weight (Brief, page 2), Appellants' do not point to any particular objective evidence supporting the criticality of this range nor the ranges of temperatures and pressures discussed in the specification which result in the claimed level of moisture. "[I]t is well settled that unexpected results must be established by factual evidence. *Geisler*, 116 F.3d at 1470, 43 USPQ2d at 1365. Attorney arguments in the Brief cannot take the place of evidence. *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972). Furthermore, we note that "[m]ere argument or conclusory statements in the specification does not suffice." *In re De Blauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1994). Therefore, we conclude that the totality of the evidence supports a conclusion of *prima facie* obviousness with respect to the process of claim 1 and those claims dependent thereon.

The Apparatus

Claim 14 is directed to an apparatus, namely, a roll sputter system. As an initial matter, we note that the claimed apparatus was rejected over the combination of Swisher, Lindsay, Sartor and Ho. However, the Examiner provides no reasoning specific to claim 14 that we can locate tending to show that this combination of art describes or suggests a roll sputtering apparatus as claimed. As the Examiner carries the burden of proof in establishing a *prima facie* case of obviousness and that burden

has not been met on the present record, we reverse the rejection of claim 14 over Swisher, Lindsay, Sartor and Ho.

The Examiner also rejects the apparatus of claim 14 over Swisher in view of Meckel. However, we agree with Appellants that the combination of Swisher and Meckel would not have led one of ordinary skill in the art to construct the apparatus defined in claim 14. Swisher describes an apparatus containing a sputtering station 15. The sputtering station does not contain a chill drum and thus cannot be interpreted as being a “chill drum section” as recited in claim 14. Meckel describes a sputtering apparatus which includes chill rolls 35 on opposite sides of sputtering cathodes 40a-c (Fig. 3). Were one of ordinary skill in the art to have combined the teachings of Meckel with those of Swisher, the result would have been a sputter cathode with chill rolls on either side upstream and downstream of the sputtering cathode. A chill drum section wherein the film passes directly between the cathode and chill drum so that the film is in contact with the drum during sputtering would not have been the result. Therefore, the combination of Swisher and Meckel would not have suggested to one of ordinary skill in the art the claimed apparatus.

We conclude that the Examiner has failed to establish a *prima facie* case of obviousness with respect to the apparatus of claim 14.

CONCLUSION

To summarize, the decision of the Examiner to reject claims 1-7 and 9-11 under 35 U.S.C. § 103 is affirmed, but the decision to reject claim 14 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

JOHN D. SMITH)	
Administrative Patent Judge)	
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